OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **LOWER BEECH POND** the program coordinators recommend the following actions. *Since this is only the second year this pond has participated in VLAP the data does not yet reflect trends with the parameters discussed below. We urge the association to continue sampling Lower Beech Pond in the future so we will be able to determine the general lake quality more easily. Also, trend analysis would be more accurate if the association added two more sampling events to the summer program. Since weather patterns and watershed activity change over the course of the summer, additional sampling events will better reflect the lake quality.*

FIGURE INTERPRETATION

- Figure 1: These graphs illustrate concentrations of chlorophyll-a in the water column. Algae are microscopic plants that are a natural part of lake ecosystems. Algae contain chlorophyll-a, a pigment necessary for photosynthesis. A measure of chlorophyll-a can indicate the abundance of algae in a lake. The brief historical data (the bottom graph) show that the in-lake chlorophyll-a concentration for August 2000 was similar to the June 1999 data. This information is based on only two data points. Algal abundance remains below the NH mean value and we hope to see this continue. While algae are present in all lakes, an excess amount of any type is not welcomed. Concentrations can increase when there are external and internal sources of phosphorus, which is the nutrient algae depend upon for growth. It's important to continue the education process and keep residents aware of the sources of phosphorus and how it influences lake quality.

- Figure 2: Water clarity is measured by using a Secchi disk. Clarity, or transparency, can be influenced by such things as algae, sediments from erosion, and natural colors of the water. The graphs on this page show historical and current year data. The lower graph shows *little change* in lake transparency between the two years of sampling. Water clarity was slightly higher in August over last June, and results are above the NH mean reference line. The 2000 sampling season was considered to be wet and, therefore, average transparency readings are expected to be slightly lower than last year's readings. Higher amounts of rainfall usually cause more eroding of sediments into the lake and streams, thus decreasing clarity.

- Figure 3: These figures show the amounts of phosphorus in the epilimnion (the upper layer in the lake) and the hypolimnion (the lower layer); the inset graphs show current year data. Phosphorus is the limiting nutrient for plants and algae in New Hampshire waters. Too much phosphorus in a lake can lead to increases in plant growth over time. Phosphorus concentrations *decreased* in the epilimnion, but *increased* in the hypolimnion. Dissolved oxygen concentrations were depleted in the lower layer of the lake in August, which is a contrast to the oxygen concentrations observed in June 1999. It seems that as the summer progresses, oxygen is depleted in the lower layer, which can cause phosphorus bound to the sediment to be released into the water column. This may explain the slightly elevated phosphorus concentrations observed this season. Consult the Other Comments section below for more details. Sampling throughout the summer season will allow us to track phosphorus changes in the lake so we can accurately construct a trend in phosphorus concentration. One of the most important approaches to reducing phosphorus levels is educating the public. Humans introduce phosphorus to lakes by several means: fertilizing lawns, septic system failures, and detergents containing phosphates are just a few. Keeping the public aware of ways to reduce the input of phosphorus to lakes means less productivity in the lake. Contact the VLAP coordinator for tips on educating your lake residents or for ideas on testing your watershed for phosphorus inputs.

OTHER COMMENTS

- In August this season, oxygen was depleted in the last 4½ meters of the lake (Table 9), compared with the high oxygen content of the hypolimnion last June. The process of decomposition in the sediments depletes dissolved oxygen on the bottom of the lake. As bacteria break down organic matter, they deplete oxygen in the water. When oxygen gets below 1 mg/L, phosphorus normally bound up in the mud may be released into the water column, a process that is referred to as *internal loading*. This explains the higher phosphorus in the hypolimnion (lower water layer) versus the epilimnion (upper layer). Since an internal source of phosphorus to the lake is present, limiting or eliminating external phosphorus sources in the lake's watershed is even more important for lake protection.

- Conductivity is relatively low for all sites tested in the Lower Beech Pond watershed (Table 6), and is in the average range for NH lakes and ponds (See the Chemical Monitoring Parameters section). Conductivity increases often indicate the influence of human activities on surface waters. Septic system leachate, agricultural runoff, iron deposits, and road runoff can all influence conductivity.

We are pleased to report that these factors are not increasing the conductivity of Lower Beech Pond.

- Phosphorus concentrations in the Inlet and Outlet decreased significantly this season (Table 8). The rainy weather this season helped to increase the flushing rate of the tributaries, thereby reducing stagnant waters. The accumulation of nutrients in stagnant water can elevate phosphorus concentrations. The Inlet is also fed by a wetland, which is a natural source of phosphorus to the pond, and can increase phosphorus concentrations of a sample.

- *E. coli* originates in the intestines of warm-blooded animals (including humans) and is an indicator of associated and potentially harmful pathogens. Bacteria concentrations were very low at all the sites tested (Table 12), and do not seem to be a threat to the pond at this time. Please consult the Other Monitoring Parameters section of the report for the current standards for *E. coli* in surface waters.

NOTES

- Monitor's Note (8/16/00): Rainy and foggy while sampling. Filamentous green algae along shore in some places.

- Biologist's Note (8/16/00): Inlet A sample is sample from boat.

USEFUL RESOURCES

Comprehensive Shoreland Protection Act, RSA 483-B, WD-BB-35, NHDES Fact Sheet. (603) 271-3503 or www.state.nh.us

Wetlands: More Important Than You Think, NHDES Booklet, (603) 271-3503 or www.state.nh.us

Save Our Streams Handbook for Wetlands Conservation and Sustainability. (800) BUG-IWLA, or visit www.iwla.org

Bacteria in Surface Waters, *WD-BB-14*, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

Lakes, Lake Protection Tips: Some Do's and Don'ts for Maintaining Healthy WD-BB-9, NHDES Fact Sheet, (603) 271-3503 or www.state.nh.us

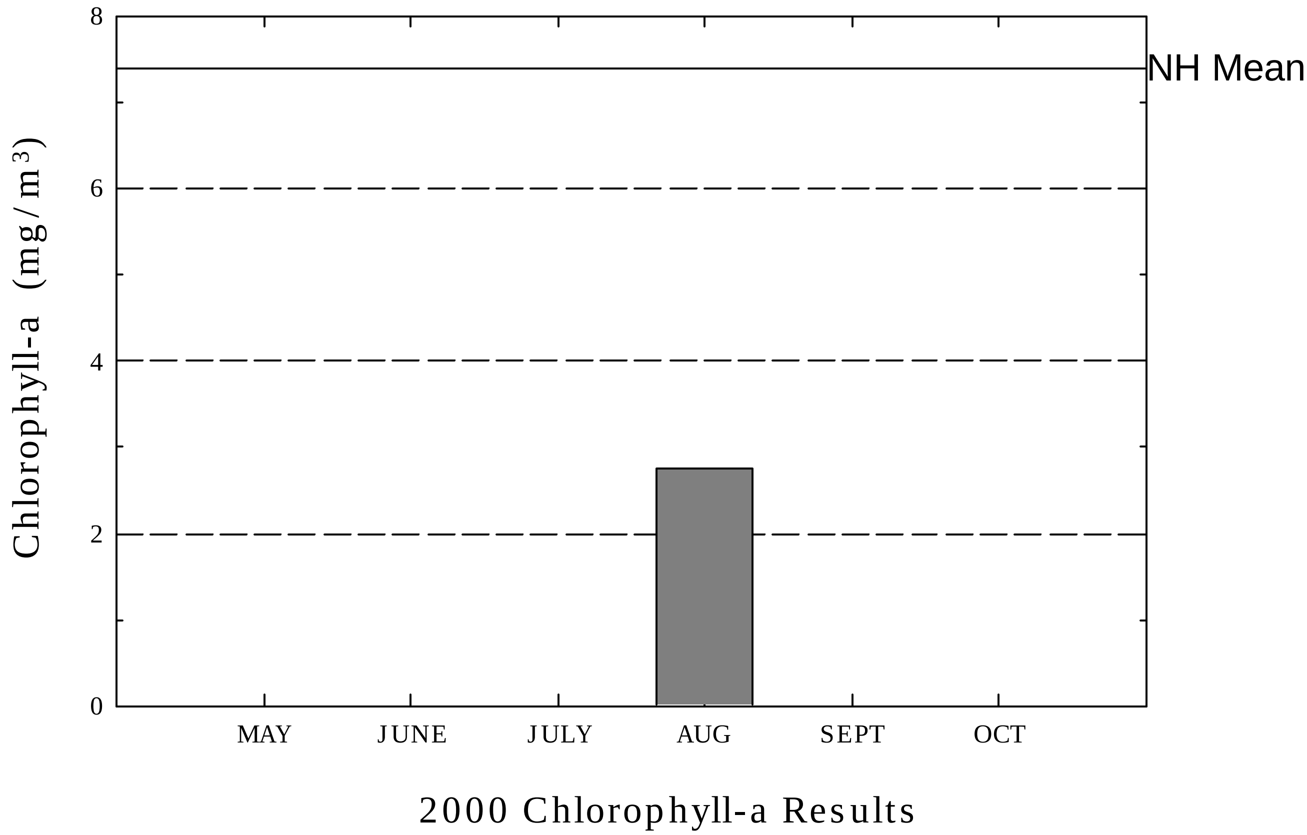
Effects of Phosphorus on New Hampshire's Lakes, NH Lakes Association pamphlet, (603) 226-0299 or www.nhlakes.org

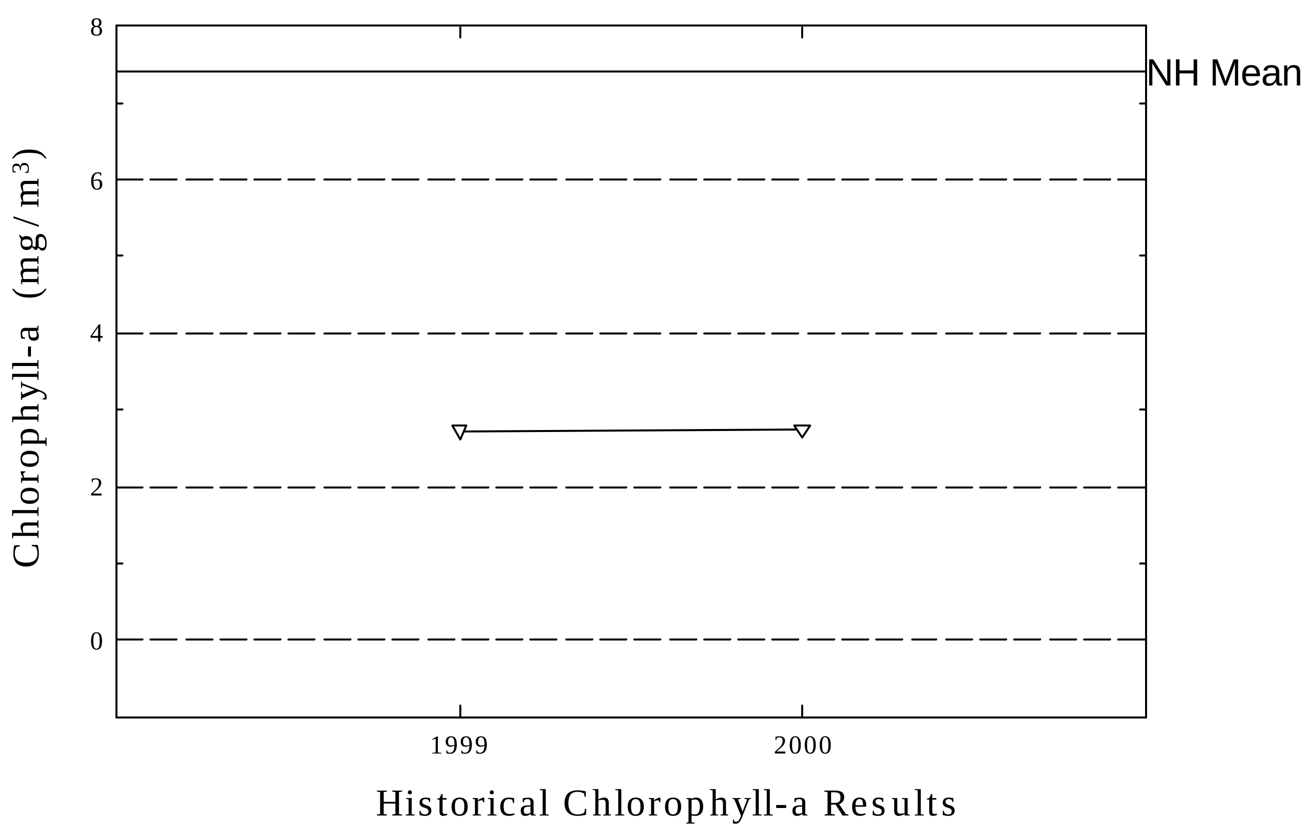
Clean Water in Your Watershed. Terrene Institute, 1993. (800) 726-5253, or www.terrene.org

Handle With Care: Your Guide to Preventing Water Pollution. Terrene Institute, 1991. (800) 726-5253, or www.terrene.org

Lower Beech Pond

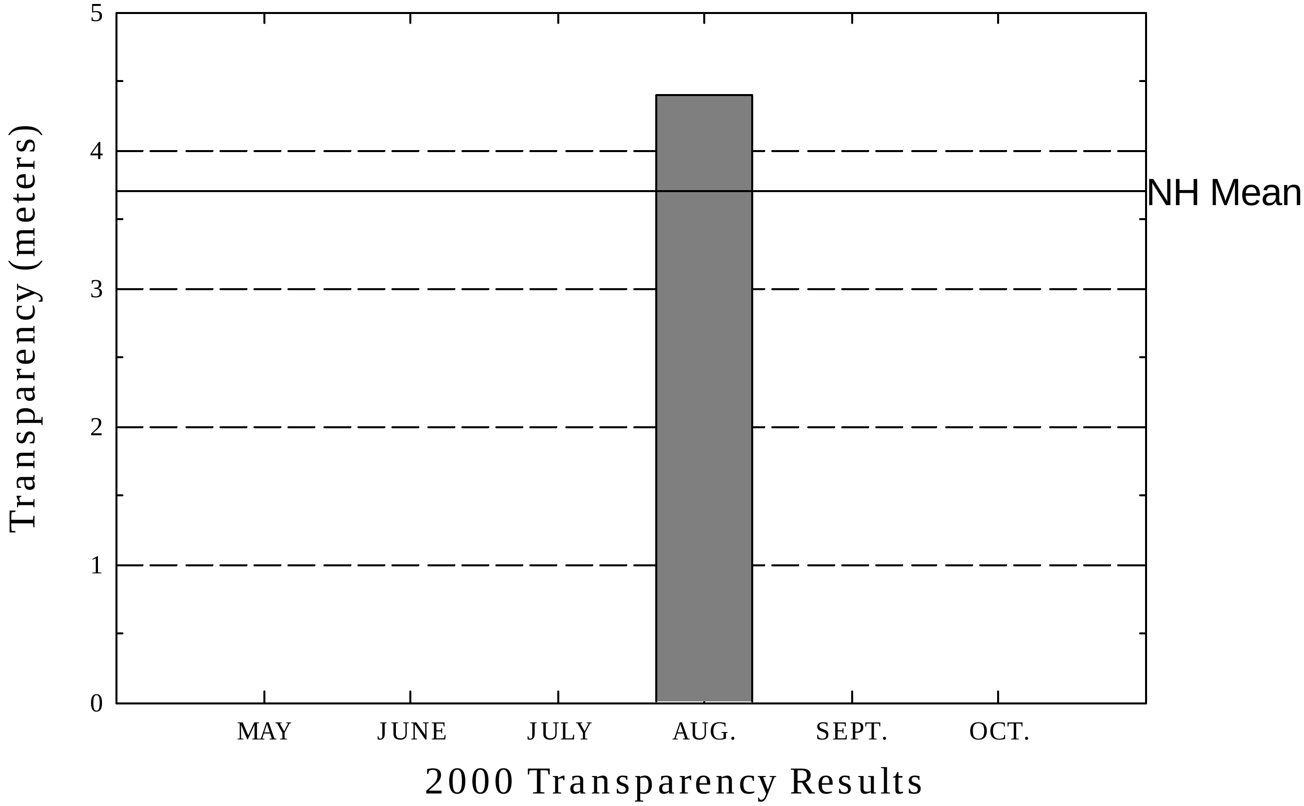
Figure 1. Monthly and Historical Chlorophyll-a Results

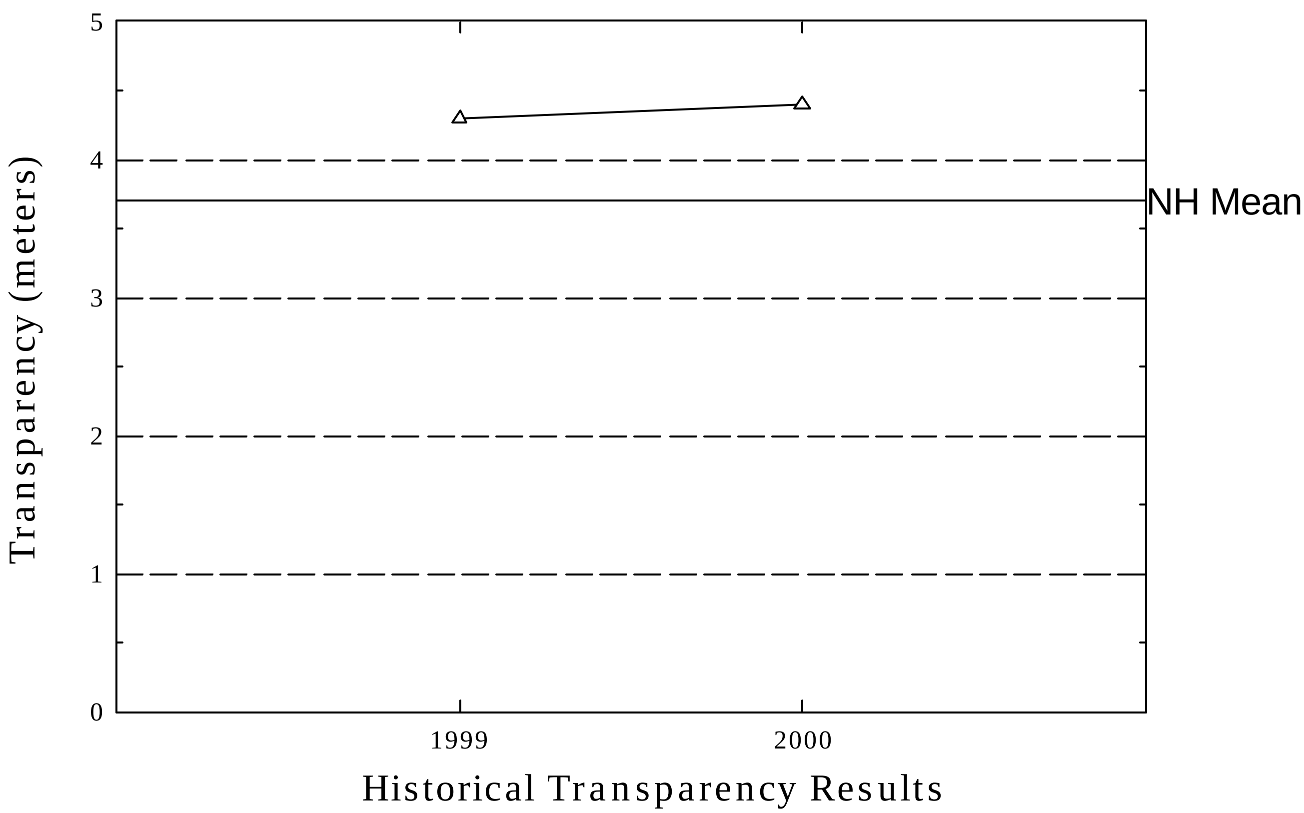




Lower Beech Pond

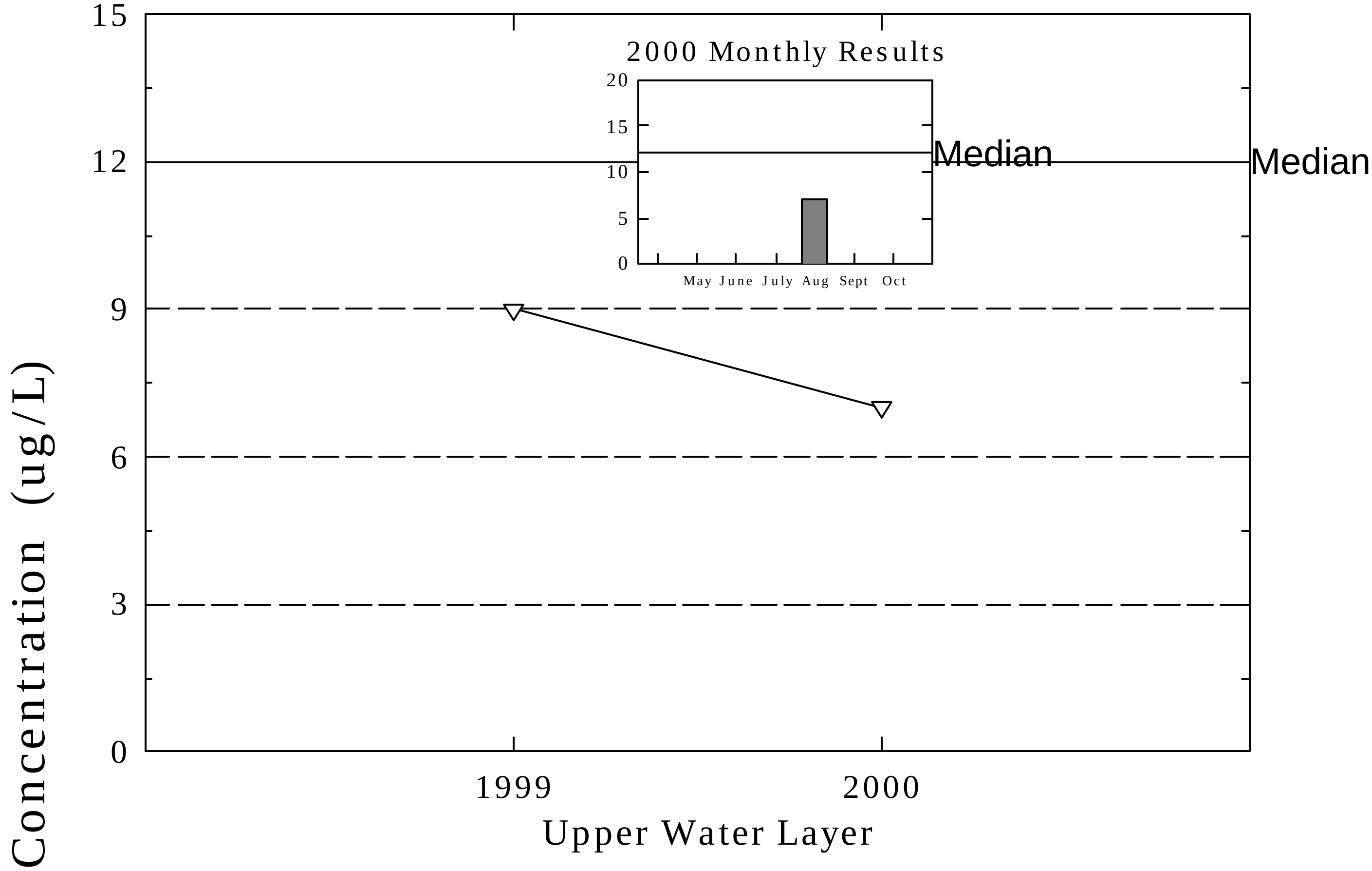
Figure 2. Monthly and Historical Transparency Results





Lower Beech Pond

Figure 3. Monthly and Historical Total Phosphorus Data.



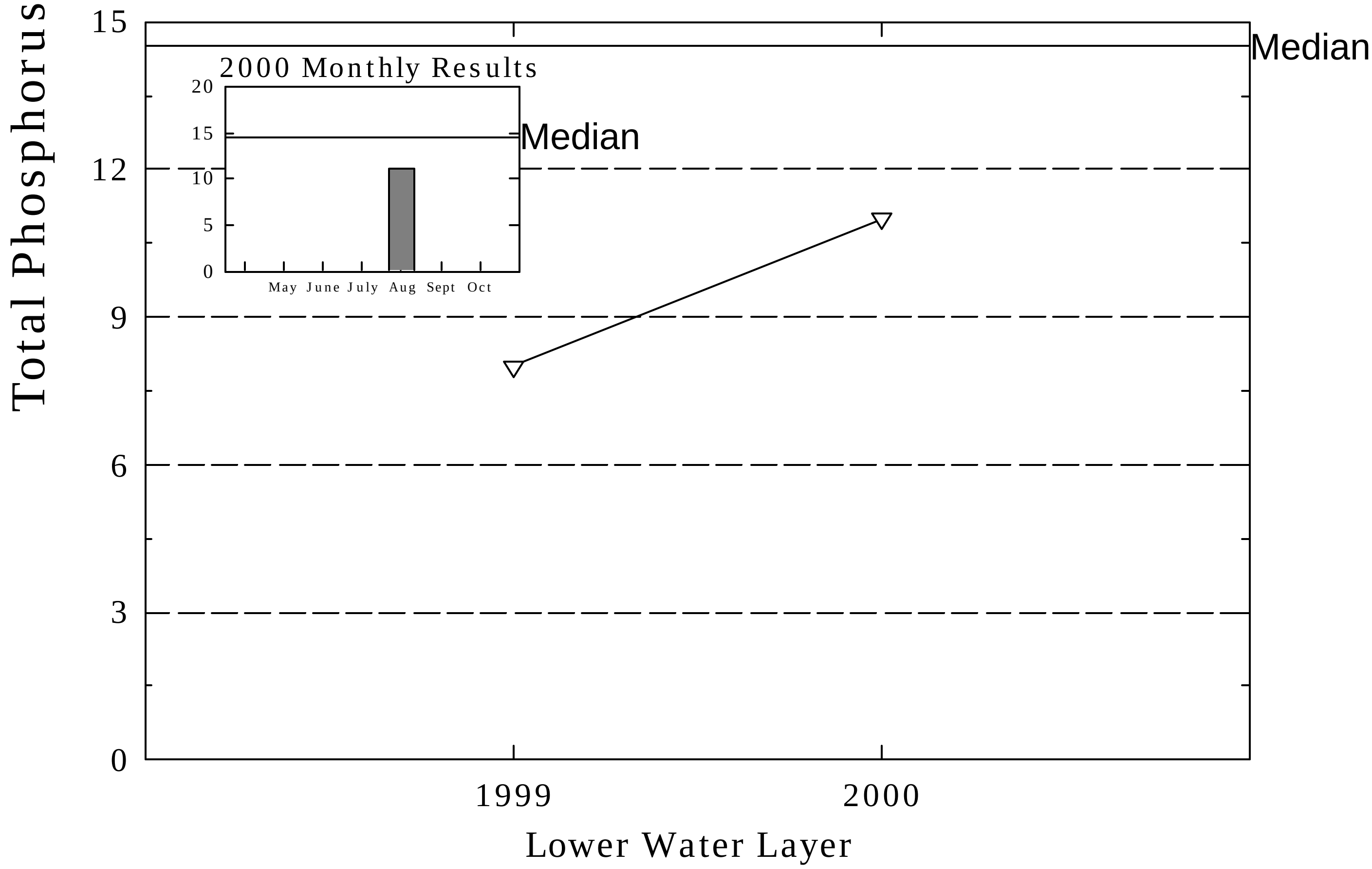


Table 1.

LOWER BEECH POND

TUFTONBORO

Chlorophyll-a results (mg/m^3) for current year and historical sampling periods.

Year	Minimum	Maximum	Mean
1999	2.73	2.73	2.73
2000	2.75	2.75	2.75

Table 2.

LOWER BEECH POND

TUFTONBORO

Phytoplankton species and relative percent abundance.

Summary for current and historical sampling seasons.

Date of Sample	Species Observed	Relative % Abundance
06 / 07 / 1999	DINOBRYON	38
	ASTERIONELLA	25
	CHRYSOSPHAERELLA	22
08 / 16 / 2000	DINOBRYON	33
	CHRYSOSPHAERELLA	22
	SYNURA	16

Table 3.

LOWER BEECH POND

TUFTONBORO

Summary of current and historical Secchi Disk transparency results (in meters).

Year	Minimum	Maximum	Mean
1999	4.3	4.3	4.3
2000	4.4	4.4	4.4

Table 4.

LOWER BEECH POND
TUFTONBORO

pH summary for current and historical sampling seasons.
Values in units, listed by station and year.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	6.49	6.49	6.49
	2000	6.53	6.53	6.53
HYPOLIMNION				
	1999	6.05	6.05	6.05
	2000	5.94	5.94	5.94
INLET				
	1999	6.20	6.20	6.20
	2000	6.11	6.11	6.11
METALIMNION				
	1999	6.28	6.28	6.28
	2000	6.44	6.44	6.44
OUTLET				
	1999	6.36	6.36	6.36
	2000	6.49	6.49	6.49

Table 5.

LOWER BEECH POND

TUFTONBORO

Summary of current and historical Acid Neutralizing Capacity.
Values expressed in mg/L as CaCO .

Epilimnetic Values

Year	Minimum	Maximum	Mean
1999	2.70	2.70	2.70
2000	3.00	3.00	3.00

Table 6.

LOWER BEECH POND

TUFTONBORO

Specific conductance results from current and historic sampling seasons. Results in uMhos/cm.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	26.8	26.8	26.8
	2000	27.3	27.3	27.3
HYPOLIMNION				
	1999	27.1	27.1	27.1
	2000	30.0	30.0	30.0
INLET				
	1999	29.2	29.2	29.2
	2000	31.0	31.0	31.0
METALIMNION				
	1999	26.7	26.7	26.7
	2000	27.9	27.9	27.9
OUTLET				
	1999	27.0	27.0	27.0
	2000	27.3	27.3	27.3

Table 8.

LOWER BEECH POND
TUFTONBORO

Summary historical and current sampling season Total Phosphorus data. Results in ug/L.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	9	9	9
	2000	7	7	7
HYPOLIMNION				
	1999	8	8	8
	2000	11	11	11
INLET				
	1999	38	38	38
	2000	16	16	16
METALIMNION				
	1999	9	9	9
	2000	9	9	9
OUTLET				
	1999	21	21	21
	2000	8	8	8

Table 9.

LOWER BEECH POND

TUFTONBORO

Current year dissolved oxygen and temperature data.

Depth (meters)	Temperature (celsius)	Dissolved Oxygen (mg/L)	Saturation (%)
August 16, 2000			
0.1	22.1	7.8	89.2
1.0	22.1	7.8	89.1
2.0	22.1	7.7	87.6
3.0	22.0	7.8	88.9
4.0	22.0	7.7	88.1
5.0	20.4	8.3	91.9
6.0	15.4	9.8	98.3
7.0	11.9	4.4	41.1
8.0	10.3	1.8	15.9
9.0	9.2	0.9	7.7
10.0	8.8	1.0	8.8
11.0	8.3	0.8	6.7
12.0	8.1	0.4	3.6
12.5	8.1	0.4	3.8

Table 10.

LOWER BEECH POND

TUFTONBORO

Historic Hypolimnetic dissolved oxygen and temperature data.

Date	**Depth** (meters)	**Temperature** (celsius)	**Dissolved Oxygen** (mg/L)	**Saturation** (%)
June 7, 1999	12.0	7.1	7.5	61.0
August 16, 2000	12.5	8.1	0.4	3.8

Table 11.

LOWER BEECH POND

TUFTONBORO

Summary of current year and historic turbidity sampling.
Results in NTU's.

Station	Year	Minimum	Maximum	Mean
EPILIMNION				
	1999	0.3	0.3	0.3
	2000	0.3	0.3	0.3
HYPOLIMNION				
	1999	0.4	0.4	0.4
	2000	0.4	0.4	0.4
INLET				
	1999	1.2	1.2	1.2
	2000	0.3	0.3	0.3
METALIMNION				
	1999	0.5	0.5	0.5
	2000	0.3	0.3	0.3
OUTLET				
	1999	2.4	2.4	2.4
	2000	0.3	0.3	0.3

Table 12.

LOWER BEECH POND

TUFTONBORO

Summary of current year bacteria sampling.
Results in counts per 100ml.

Location	Date	E. Coli See Note Below
INLET A		
	August 16	1
INLET		
	August 16	9

NOTE: "<" means "less than" and ">" means "greater than"